Solutions for Smarter Driving
Telematics and Networking
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It is estimated that 80% of all innovations in the automotive industry today are directly or indirectly enabled by electronics. With vehicle functionality improving with every new model this means a continuous increase in the semiconductor content per car. With over 30 years’ experience in automotive electronics, ST is a solid, innovative, and reliable partner with whom to build the future of transportation.

ST’s Smart Driving products and solutions are making driving safer, greener and more connected through the combination of several of our technologies.

**SAFER**
Driving is safer thanks to our Advanced Driver Assistance Systems (ADAS) products – vision processing, radar, imaging and sensors, as well as our adaptive lighting systems, user display and monitoring technologies.

**GREENER**
Driving is greener with our automotive processors for engine management units engine management systems, high-efficiency smart power electronics at the heart of all automotive sub-systems and Silicon Carbide devices for hybrid and electric vehicle applications.

**MORE CONNECTED**
And vehicles are more connected using our infotainment-system and telematics processors and sensors, as well as our radio tuners and amplifiers, positioning technologies, and secure car-to-car and car-to-infrastructure (V2X) connectivity solutions.

ST supports a wide range of automotive applications, from Powertrain for ICE, Chassis and Safety, Body and Convenience to Telematics and Infotainment, paving the way to the new era of car electrification, advanced driving systems and secure car connectivity.
Connectivity is revolutionizing the vehicles on our roads. Connectivity to the cloud and cloud based services benefit occupants but also manufacturers by enabling over-the-air software upgrades and predictive maintenance. The increasing count of electronic control units (ECUs) for safety, engine management, motor control, infotainment all need to be networked, upgradeable and secure. In-car connectivity for occupants, Wi-Fi or Bluetooth needs to fit seamlessly with the other networks. Vehicle-to-Vehicle (V2V) and Vehicle-to-Everything (V2X) communications are coming soon and all these communication channels need to be secured and linked with a telematics gateway.

ST’s product range covers a wide selection of telematics and networking devices from the most accurate GNSS positioning products to powerful multicore telematics processors with embedded security modules, from sensors for vehicle acceleration/deceleration monitoring and crash detection to smart gateways enabling Firmware-over-the-Air (FOTA) updates.

To provide you with the car connectivity solutions you need, we leverage our extensive hardware and software expertise and our partnerships with market leaders.
KEY APPLICATIONS

ST’s key products and solutions for Telematics and Networking applications include:

- **Vehicle to Everything (V2X)**
- **Firmware-over-the-Air (FOTA)**
- **Smart Antenna**
- **Telematics & Connectivity Control Unit**
- **Secure Connectivity Module**
- **Gateway**

SOLUTIONS

ST’s key products and solutions for Telematics and Networking applications include:

- **GNSS**
- **Bluetooth and Connectivity**
- **Power Management**
- **V2X**
- **Sensors**
- **EOS and ESD Protection**
- **Telematics & Secure Processors, 32-bit Automotive Microcontrollers**

**HW & SW Development Tools – Sample Kits, Evaluation Kits, Product Selectors**

FIND OUT MORE

www.st.com/telematics-and-networking

Vehicle-to-Everything (V2X)  Positioning & Navigation
Insurance Telematics Box  Firmware Over-the-Air (FOTA)
Smart Antenna  Gateway
Secure Connectivity

![QR Code](image-url)
TELEMATICS AND CONNECTIVITY CONTROL UNIT

Interfacing with a variety of in-vehicle data and control busses and ensuring their security is the key challenge in designing an automotive telematics unit.

The Connectivity and Networking Control Unit is at the heart of the complex telematics systems present in the latest vehicle architectures. It needs to provide all the intra-system connectivity to a number of modules or sub-systems such as wideband cellular modems and wireless connectivity modules (Bluetooth, Wi-Fi, etc.).

ST has a wide offer that includes application-specific standard products (ASSPs), embedded software and a full range of cost-optimized scalable system-on-chip (SoC) solutions for telematics control units (TCU) featuring a complete set of standard interfaces and security solutions.

Telematics and Connectivity Control Unit

FIND OUT MORE

www.st.com/telematics-and-connectivity-cu
VEHICLE-TO-EVERYTHING (V2X)

Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications, collectively referred to as vehicle-to-everything (V2X), is a wireless technology aimed at enabling data exchanges between a vehicle and its surroundings.

V2X technology, operating at 5.9 GHz, is specifically defined for fast moving objects and enables the establishment of a reliable radio link, even in non-line-of-sight conditions.

By sharing data, such as their position and speed, to surrounding vehicles and infrastructures, V2X systems improve driver awareness of upcoming potential dangers and dramatically improve collision avoidance, resulting in heavily reduced fatalities and injury severity. In addition, the technology will enhance traffic efficiency by providing warnings for upcoming traffic congestions, proposing alternative routes and ensuring eco-friendly driving, reducing CO2 emissions through adaptive cruise control and a smarter transportation management.

The technology is diverging in two standards, dedicated short range communication (DSRC) and C-V2X direct communications (PC5 protocol). DSRC has been widely tested and proven, while for C-V2X testing is in progress.

ST has a long-term partnership with Autotalks – a V2X chipset market pioneer – for the co-development of a Global V2X solution supporting both DSRC and C-V2X direct communications in a single automotive-qualified chipset, allowing the shortest time-to-market for a V2X solution that supports both standards.
V2X - Standalone solution

12 V

Power Supply Protection SMxTY

Voltage Regulator L5964

MEMS ASM330LHH

Antenna protection ESDAXLC6

BT

Balun BALF-NRG-02D3

Bluetooth Low Energy BlueNRG-132

Dataline high speed protection ASIP EMIF02X

Telematics and Connectivity microprocessor STA1385

Secure element ST33G1M2A

MEMS ASM330LHH

Telematics and Connectivity microprocessor STA1385

V2X Dual Mode (DSRC/C-V2X) chipset CRATON2
eHSM

RF Transceiver PLUTON2

CAN Transceiver L9616

CAN FD Transceiver

Ethernet Switch

Vehicle Ethernet bus

CAN bus

3G / 4G Modem

WiFi Modem

3G / 4G Modem

eSIM ST33J2M0

FIND OUT MORE
www.st.com/vehicle-to-everything-v2x
Vehicles today combine an ever increasing number of wireless connectivity and positioning technologies: Wi-Fi, for in-car hot-spots, Bluetooth, 3G/LTE cellular, IEEE 802.11 WLAN systems for Vehicle-to-Everything (V2X) and GNSS positioning.

Managing the requirements of all the underlying radio links and signal processing requirements are a challenge for system designers. Smart antenna systems ease the system design issues and ST has a range of products to support them. We offer a range of leading-edge processors, GNSS receivers, sensors and a complete family of pin-to-pin compatible terrestrial tuners.

Smart Antenna

12 V

Power Supply Protection
SMxTY

Voltage Regulator
L5964

Telematics and connectivity microprocessor
STA1385

V2X Dual Mode (DSRC/C-V2X) chipset CRATON2
eHSM

RF Transceiver
PLUTON2

MEMS inertial
ASM330LHH

Antenna protection
ESDAXLC6-1BT2Y

Bluetooth Low Energy
BlueNRG-132

Balun
BALF-NRG-02D3

Antenna protection
ESDAXLC6-1BT2Y

Modem

eSIM ST33J2M0

WiFi

Ethernet Switch

Terrestrial Tuners
STAR/DCOP/DOT

Dataline high speed protection
ASIP EMIF02X

Vehicle Ethernet bus

CAN bus

ESD Protection ESDCAN0x

CAN Transceiver L9616

Secure element ST33G1M2A

Ethernet

3G / 4G

AM/FM/HD

DAB

3G / 4G

BT

V2X

BT

3G / 4G

BT

WWW.ST.COM/SMART-ANTENNA

FIND OUT MORE
FIRMWARE OVER-THE-AIR (FOTA)

Firmware-over-the-Air (FOTA) services enable firmware downloads and updates for any of the specific electronic control units (ECUs) inside a car. With the number of ECUs in vehicles increasing, sharing diagnostic and operational data from on-board systems and components can help car makers to reduce recall expenses, increase product quality and operational efficiency, as well as deliver post-sale vehicle performance and feature enhancements.

Updates need resilience to cyberattacks and cybersecurity is of paramount importance.

We offer a full range of telematics processors, 32-bit microcontrollers and secure elements, ensuring the highest level of security and helping protect vehicles from malicious attacks.
Secure Connectivity Module

Connecting vehicles, and their internal networks, to the external world using Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I) or Vehicle-to-Everything (V2X) communications is the key enabler in creating and delivering mobility services designed to enhance convenience and safety in order to ultimately provide a better driving experience.

Connected cars, though, are vulnerable to malicious attacks that are either remote, such as unauthorized access through an external vehicle interface, or local, where a compromised ECU could be used to attack other ECUs through in-car networking.

ST provides advanced solutions from 32-bit microcontrollers with an embedded hardware security module (HSM) for robust secure solutions with tamper-resistant Secure Elements compliant with the latest security standards and Common Criteria and EAL5+ level certifications.

FIND OUT MORE
www.st.com/secure-connectivity-module
AUTOMOTIVE GATEWAYS

A gateway is a central hub that securely and reliably interconnects and transfers data across the many different networks found in vehicles. It provides physical isolation and protocol translation to route signals between functional domains (powertrain, chassis and safety, body control, infotainment, telematics, ADAS) that share data.

Vehicles are increasingly dependent on electronic control units (ECU) to manage the advanced features that enhance the driving experience. The gateway controller plays a fundamental role as a communication bridge between the various ECU networks used by these different applications, managing the exchange of data with external interfaces including CAN (low, high speed), LIN, ISO-9141, FlexRay, and Ethernet protocols.

To meet the challenge of ensuring the bandwidth, reliability, and ability to integrate the ever increasing number of features and data, ST offers automotive-grade SPC5 microcontrollers, transceivers as well as power management ICs and secure element solutions.

Automotive Gateway

FIND OUT MORE
www.st.com/automotive-gateway-telematics
Key Technologies

RESEARCH & DEVELOPMENT AND MANUFACTURING

To keep its technology edge, ST maintains a strong commitment to innovation, with approximately 7,400 people working in R&D and product design and spending about 16% of its revenue in R&D. Among the industry’s global technology leaders, ST owns and continuously refreshes a substantial patent library (~17,000 patents; ~9,500 patent families and ~500 new patent filings per year).

The Company draws on a rich pool of chip-manufacturing technologies, including advanced FD-SOI (Fully Depleted Silicon-on-Insulator) CMOS (Complementary Metal Oxide Semiconductor), differentiated Imaging technologies, RF-SOI (RF Silicon-On-Insulator), BiCMOS, BCD (Bipolar, CMOS, DMOS), Silicon Carbide, VIPower, and MEMS technologies.

ST believes in the benefits of owning manufacturing facilities and operating them in close proximity and coordination with its R&D operations. ST has a worldwide network of front-end (wafer fabrication) and back-end (assembly and test and packaging) plants. ST’s principal wafer fabs are located in Agrate Brianza and Catania (Italy), Crolles, Rousset, and Tours (France), and in Singapore. These are complemented by assembly-and-test facilities located in China, Malaysia, Malta, Morocco, the Philippines, and Singapore.
**PRODUCT SELECTORS, SAMPLES, EVALUATION BOARDS**

ST provides a set of Smart Selectors tuned to the needs of the Automotive Industry. Once the appropriate products have been selected, a wide range of samples and evaluation boards are available to help you get started and reduce your development times. In addition to boards, ST provides schematics, BOM and Gerber files to facilitate your hardware design and demonstration software packages are available too.

**Product Selectors**
Rapidly find the most relevant automotive products for your designs.

**Evaluation Boards**
ST evaluation boards help you evaluate the features and performance of selected products and system solutions that demonstrate optimized and tested solutions for your application design.

**SPC5 AUTOMOTIVE MCU EVALUATION TOOLS: EASIER EVALUATION AND FASTER DEVELOPMENT**

A complete range of hardware evaluation and emulation tools supports the SPC5 family of automotive microcontrollers. Discovery and Premium development boards are available to support your development from preliminary evaluation through to advanced solution development.

ST Discovery boards, available for each product line, enable a quick and easy way to evaluate the microcontroller’s main features. The expansion connector makes it easy to plug in application and extension modules for rapid prototyping.

ST Premium boards, available for all lines and packages, provide user access to the device’s complete feature set and functionalities for advanced development. The SPC5 motherboards, used in combination with adapters, enable full access to all of the MCU’s signals and peripherals (such as CAN, SPI, LIN, FlexRAY and Ethernet).

The offer is complemented by a series of emulation solutions for high-speed tracing, monitoring and bypassing.

A full range of state-of-the-art tools and software from major third parties is also available for the SPC5 family of automotive microcontrollers.

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**FIND OUT MORE**

www.st.com/auto-sp5-mcu-evaltools
ST’s Modular Telematics Platform (MTP) provides an open development environment for prototyping advanced Smart Driving applications, particularly those requiring secured vehicle connectivity to back-end servers, cloud services or road infrastructure. Its main central computing module is based on the Telemaco3P, the industry’s first automotive processor to include a dedicated Hardware Security Module (HSM) providing state-of-the-art on-chip security, authentication and cryptography. MTP also offers a comprehensive set of automotive-connectivity devices both on the board and in plug-in modules, ensuring development flexibility and extensibility.

MTP integrates ST’s automotive-grade multi-constellation GNSS Teseo IC, with dead-reckoning sensors. An optional on-board ST33 Secure Element is available to further enhance the security of the platform. The platform supports automotive buses including CAN, FlexRay, and BroadR-Reach® (100Base-T1), while optional Bluetooth™ low energy, Wi-Fi, and LTE modules offer access to wireless networks.

Designed for advanced automotive telematics use cases including remote diagnostics and secure Electronic-Control-Unit (ECU) Firmware-over-the-Air (FOTA) updating, the MTP includes extension connectors for V2X and precise positioning modules too.

On top of this extensive hardware offering, the MTP Quick Start Package and the Board Support Package (BSP) based on open source Linux, FreeRTOS, and Yocto complete the package to enable agile solution prototyping.